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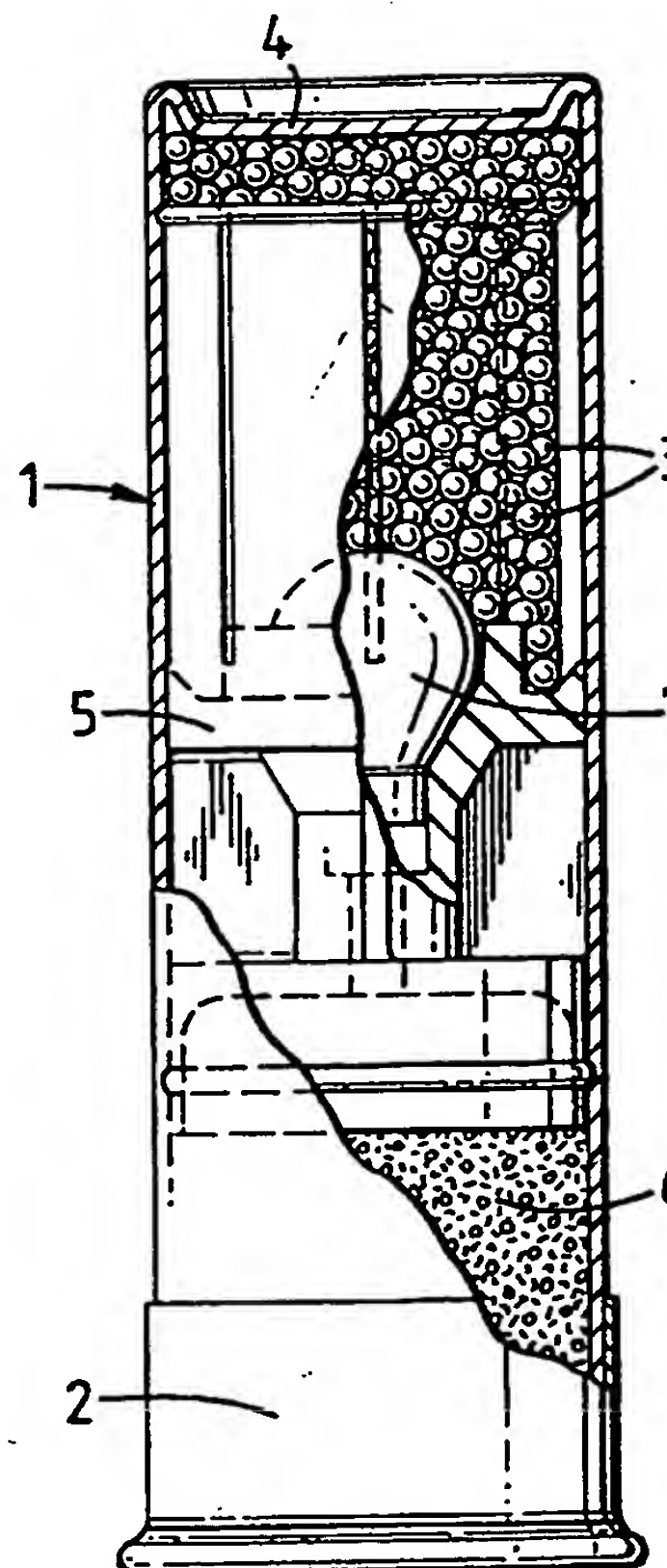
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54 Shotgun cartridge shell with tracer.

57 A shotgun cartridge has a tracer element 7 of aerodynamic form and a main wad designed to expel the element (7) on firing and to impart a rotational movement thereto.



**FIG. 1**

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This invention relates to a shotgun cartridge or shell including a tracer element. The objective of the present invention is to provide a trace which indicates the flight of the shotgun pellets rather than the cartridge wad.

More particularly the invention relates to a shotgun cartridge wherein a tracer element seats in a shaped recess on the front surface of the main wad and is discharged with the pellets when the cartridge is fired. The tracer element has an internal combustible charge and a passage extends rearwardly from this charge through the wad to communicate with the propellant at the rear of the cartridge. When the cartridge is fired the propellant ignites the internal charge of the tracer element which provides the visible trace. Such a cartridge is described in U.S. Patent No. 4,841,866.

The shotgun cartridge in accordance with the present invention is characterised by the following features singly or in combination:

(1) The tracer element has a tail and is shaped and weighted so as to be stable in flight and fly with the charge of pellets. Specifically the passage extends through the tail from a position short of the geometric centre of the element thereby providing the element with a forwardly positioned centre of gravity which assists stability in flight. The aerodynamic shaping is such as to create suction at the rear again stabilising the flight path. In determining the internal form of the element the propulsive effect of the combustible charge is taken into account and specifically the passage should be as wide as possible.

(2) The recess in the front surface of the wad in which the tracer element seats is defined by a rim spaced from the inner surface of the wad. Pellets located between the rim and the wad, on firing, squeeze the rim inwardly to eject the tracer element and propel it forwardly. The wad is so designed as to deform in an asymmetric manner on firing to impart a rotational movement to the wad which assists release of the tracer element from the seating and stabilises the released and forwardly propelled element within the pellets.

The present invention specifically envisages the features (2) above being used independently of the features (1).

The invention will now be described by way of example with reference to the accompanying sectional drawings wherein:-

Figure 1 is a partly broken away view of a cartridge in accordance with the invention;

Figure 2 is a section through the tracer element,

Figure 3 is a section through the wad; and

Figure 4 is an enlarged detail of Figure 3.

Referring to Figure 1 the cartridge of the invention comprises a cylindrical casing 1 usually of plastics with a metal base 2 crimped onto it. A percussion

cap is positioned centrally of the base. A charge of pellets 3 is contained at the front of the cartridge by a closure 4 and a wad 5 separates these pellets from a charge 6 of explosive propellant. A tracer element 7 seats in the front of the wad. The wad 5 and tracer element 7 are particular to the invention.

Thus referring to Figure 2 the tracer element 7 is of truncated pear-drop shape, rather similar to an electric lamp bulb, having an aerodynamic body part 8 and a short rearwardly extending neck 9 to seat in the wad in a manner to be described. A short wide passage 10 with a tapered front end extends concentrically forward from the rear and terminates at a position short of geometric centre of the body 8, thereby ensuring a forward centre of gravity. Passage 10 contains an igniter charge, typically a mixture comprising a major part (85% typically) of barium peroxide, a minor part (typically 12%) of magnesium, a colour imparting substance e.g. strontium nitrate, and a binder, sulphur being rigorously excluded. The formation of this mixture is in the pyrotechnics art. The passage is made as wide as possible to reduce the propulsive effect of the burning igniter charge which effect tends to throw the tracer element off course. The tracer element is typically formed of aluminium but other metals may be used to be compatible with different types of shot.

The centre of gravity of the tracer element is forward of geometric centre which again assists the element in flying true.

As can be seen in Figure 1 and 3 of the drawings the wad 5 is of the piston-type and comprises a front cylindrical portion 11 to receive the pellets 3, a rear portion 12 to fit and slide within the barrel and to receive the propellant explosive charge. The portion 11 is made up of a plurality four, six or preferably eight separate parts or petals 11a. The front and rear portions are interconnected by a stem 13 with strengthening vanes 13a.

A fitted seating for the tracer element 7 comprises an upstanding rim 14 surrounding a frusto-conical socket 15 with a cylindrical base 15a to receive tail 9. A passage 16 extends from 15a to the propellant charge.

As best can be seen in Figure 1 the space 18 surrounding the rim 14 receives pellets and is bounded by an inclined shoulder 19 so that on firing a radially inward force is developed by the pellets which force compresses the rim inwardly to squeeze the tracer element forwardly and expel it. This inward compression is allowed by the plastics from which the wad is formed. This plastics material typically a Low Density Polyethylene resiliently deforms to absorb the energy of collisions between the shot and the tracer element which might otherwise affect the true flight of the element.

As can be seen in Figure 4 the right angled joints between the piston part and the vanes 13a of the web

13 are strengthened at one side by the radiussing R. This differential strengthening causes each vane to deform in a similar manner under the compressive force of explosion of the charge 6. The resultant asymmetrical force causes the wad to rotate on firing thereby:-

- (a) assisting in discharging the tracer element from its seat, and
- (b) tending to hold the pellets and the tracer element together in the barrel so that the tracer element accompanies the pellets in flight.

### Claims

1. A shotgun cartridge wherein a tracer element (7) seats in a shaped recess on the front surface of the main wad (5) and is discharged with the pellets when the cartridge is fired characterised in that the tracer element (7) is shaped and weighted so as to be stable in flight and fly with the charge of pellets.
2. A shotgun cartridge according to Claim 1 wherein the tracer element has a tail (9) wherein a passage (10) extends through the tail to a position short of the geometric centre of the element thereby providing the element with a forwardly positioned centre of gravity.
3. A shotgun cartridge according to either Claim 1 or Claim wherein the recess in the front surface of the wad is defined by a rim (14) spaced from the inner surface of the wad.
4. A shotgun cartridge according to Claim 3 wherein space (18) surrounding the rim (14) receives pellets and is bounded by an inclined shoulder (19).
5. A cartridge according to any of the preceding claims wherein the wad is so constructed as to deform in an assymetric manner on firing to impart rotational movement of the wad.
6. A cartridge according to Claim 5 wherein the wad has radial vanes (13a) each being reinforced at one side only.
7. A tracer element for a shotgun cartridge comprising a body (8) aerodynamically shaped so as to create suction at the rear in flight, a short wide passage (10) extending from the rear of the cartridge to the interior thereof and terminating at a position short of the geometric centre of the shell thereby providing a frontwardly positioned centre of gravity.
8. A wad for a shotgun cartridge comprising a front portion (11) including a seating for a tracer element (7), a rear portion (12) to fit the interior of the gun barrel, an interconnecting stem (13) with radially outwardly extending vanes (13a) characterised in that the seating is defined by a rim (14) surrounded by an annular space (18) and in that the vanes (13a) are differentially strengthened so as on firing to deform and impart a rotational movement to the wad.
9. A wad according to Claim 8 wherein the space (18) is bounded by an inclined shoulder (19).

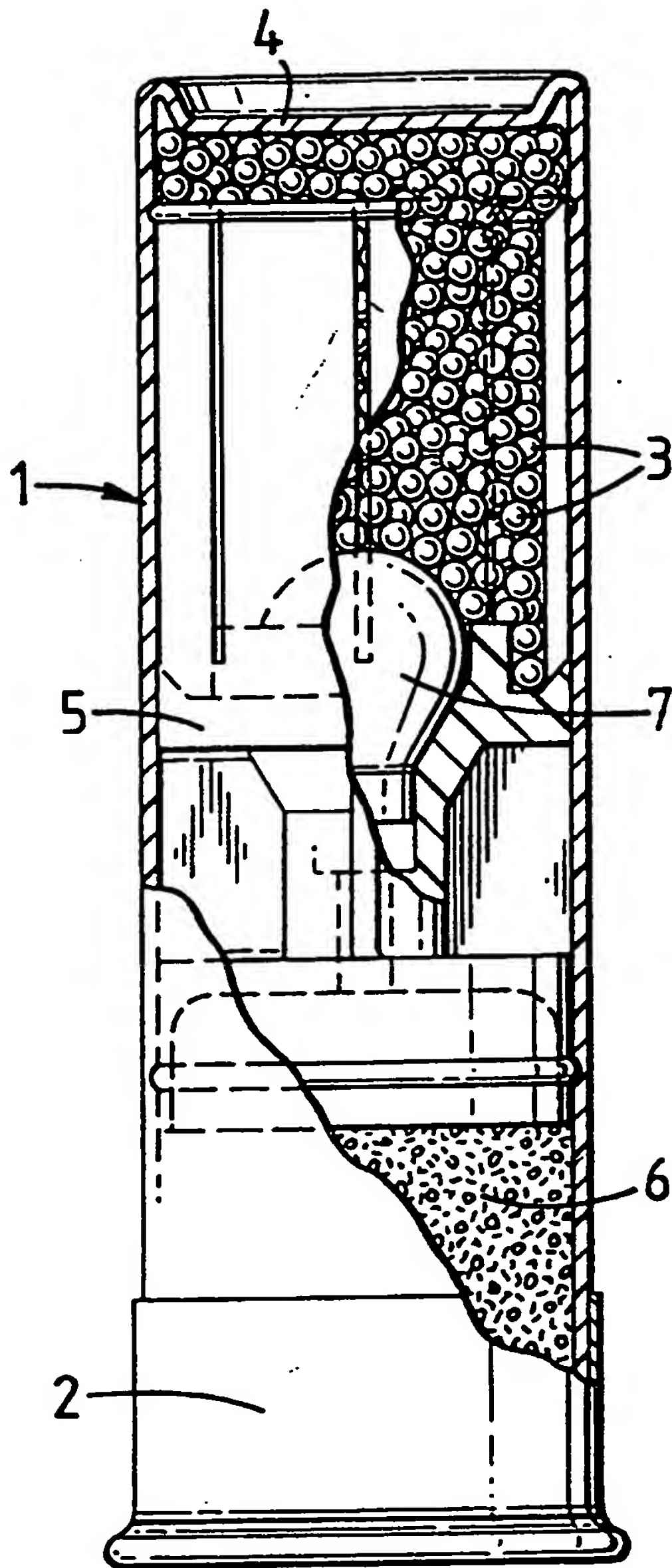


FIG. 1

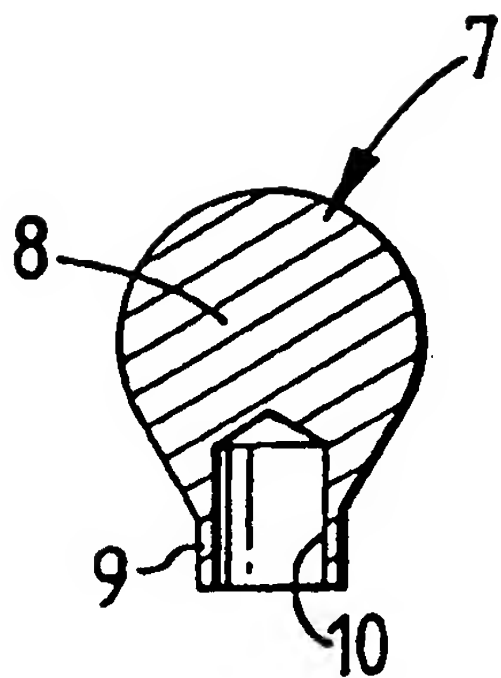


FIG. 2

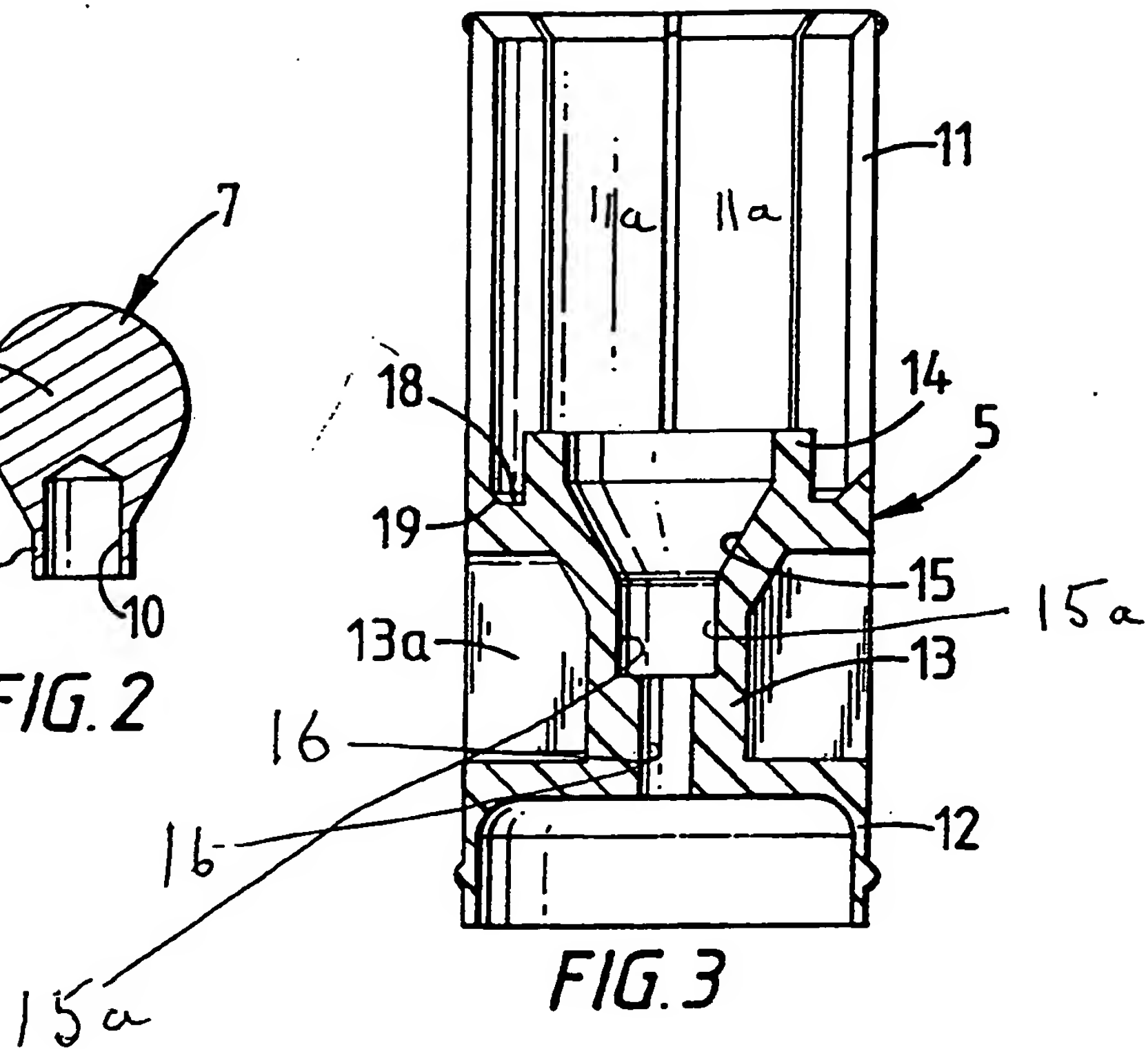


FIG. 3

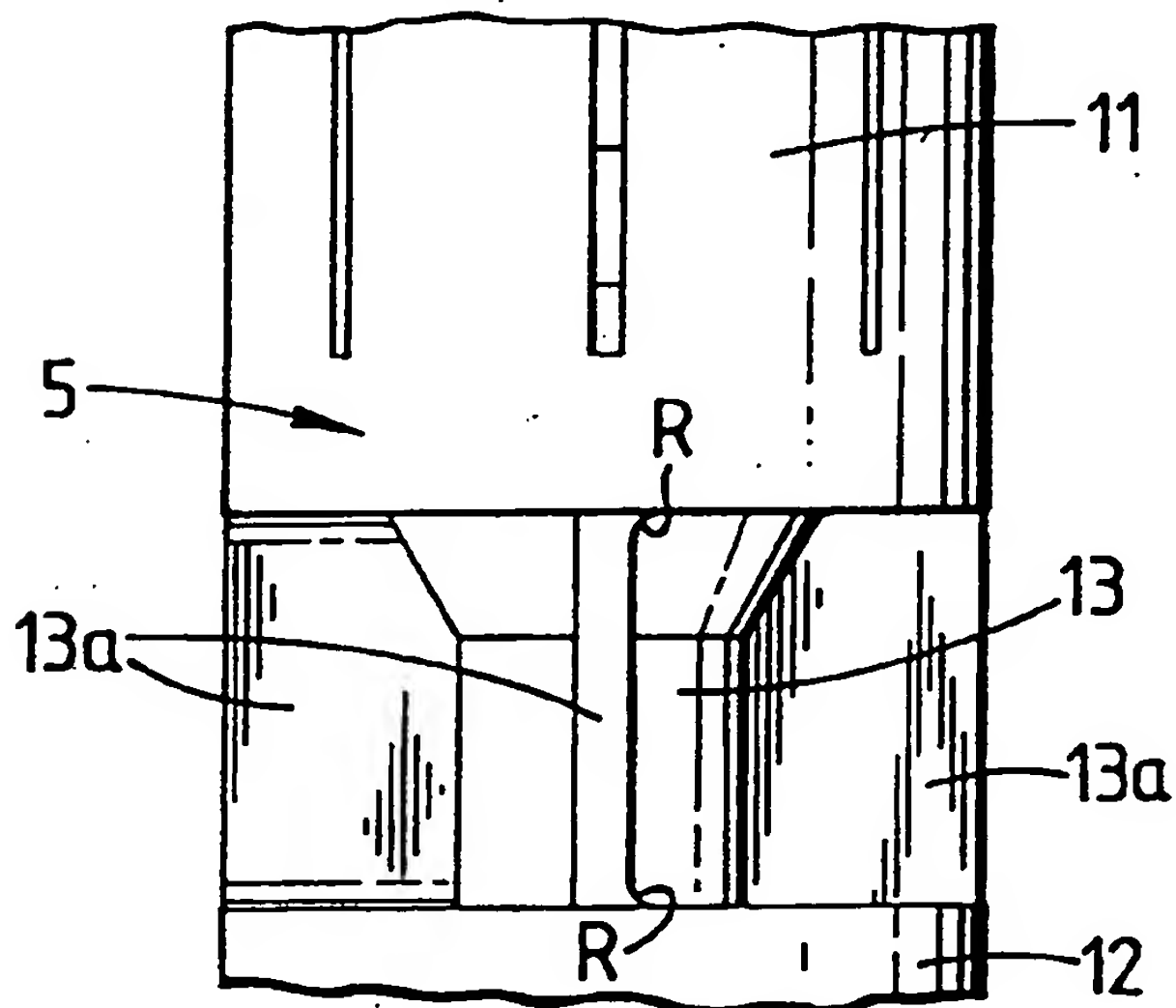


FIG. 4

# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/BG 94/00001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4841866	27-06-89	CA-A- 2008204	02-08-90
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